The Blind Trechine Beetles of the Genus Kurasawatrechus from the Southern Japanese Alps

Ву

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上野俊一*:南アルプスに見られるクラサワメクラチビゴミムシ類

The so-called Southern Japanese Alps are one of the highest mountain ranges in the Japanese Islands. They are roughly equivalent to an assemblage of three mountain ranges, called the Kamanashis, Akaishis and Shiranés, and stretch from near Lake Suwa-ko in the north to near the Pacific coast in the south for more than one hundred kilometres. These mountains are invariably steep and are crowned with peaks attaining to the height of 3,000 m or more. Because of the difficulties of access, faunal investigations were seldom made on the Southern Japanese Alps until rather recently.

The trechine beetles first reported from these mountains are two endogean species of Kurasawatrechus discovered in 1964 on Mt. Nyûgasa-yama, which is situated near the north-western end of the Kamanashi Mountain Range (cf. Uéno, 1973). Since their discovery, isolated specimens of other forms have been brought to my hands by some friends of mine, and have proved that the representatives of at least five different species-groups occur on the Southern Japanese Alps. They are the subgenus Epaphiopsis, the group of Trechiama lewisi, that of T. oreas, that of Trechus vicarius, and Kurasawatrechus. Of these, Epaphiopsis barely reaches the southern edge of the Southern Japanese Alps by two species, and cannot be regarded as a proper constituent of the fauna. The following three comprise true alpine or subalpine inhabitants, and the members of Trechus in particular are restricted to high altitude. They are now under the course of careful examination, but each species-group is probably represented by only one variable species. The last one, Kurasawatrechus, occurs from foothills to the subalpine zone, and contains four blind species hitherto brought to light.

In the present paper, I am going to take up the last-named group, to describe two new species, and to record new localities of one of the two forms previously known. The abbreviations used herein are the same as those explained in other papers of mine.

I wish herewith to express my hearty thanks to the following friends of mine, whose kind aid in various ways made the completion of this paper possible: Dr. Toshihiro Komatsu, Dr. Kimito Uchikawa, Messrs. Yutaka Arita, Sumao Kasahara, Seiji Morita, Yoshiaki

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Kurasawatrechus brevicornis S. Uéno, sp. nov.

(Figs. 1-3)

Length: 3.00-3.20 mm (from apical margin of clypeus to apices of elytra).

Not unlike K. kawaguchii in general appearance, but the body is a little smaller in size and more thickset in conformation, the dorsal surface is more convex, the head is larger, the elytra are smaller and have the shoulders obviously less effaced, and the appendages, especially the antennae, are shorter and stouter. Evidently related to K. longulus in genitalic structure, but the colour is much darker, and the body is larger, broader and much more thickset, having shorter antennae and much broader elytra.

Colour dark reddish brown, shiny; palpi, apical half of antennae, ventral surface of hind body, and legs more or less lighter than dorsum, though not so light as in K. kawaguchii. Head as in K. longulus, though the genae are more evenly convex and the palpi are less stout;

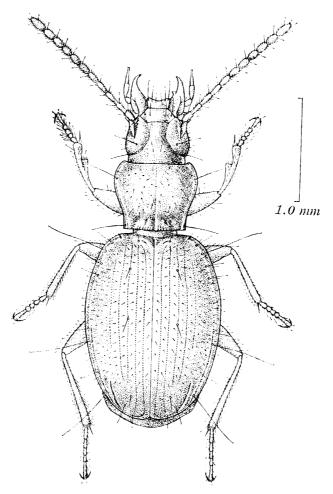
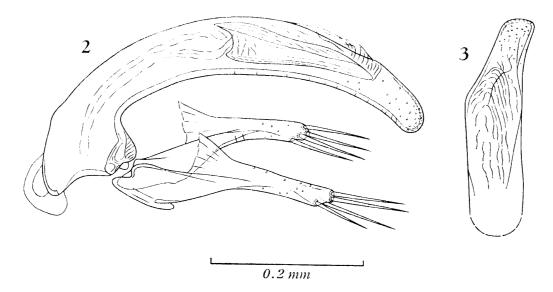


Fig. 1. Kurasawatrechus brevicornis S. Uéno, sp. nov., ; from the Sanpuku-tôgé on the Akaishi Mountain Range.

antennae short, stout and submoniliform, reaching basal one-fifth of elytra or a little shorter than that in \Im , extending a little beyond basal one-sixth of elytra in \Im ; antennal segments 8–10 each short oval and about two-thirds as wide as long, terminal segment the largest. Pronotum as in K. kawaguchii, but the disc is a little more convex, the basal part is shorter, the front angles are broader, less produced and more widely rounded, the hind angles are nearly rectangular, and the meshes of microsculpture are generally less wide; PW/HW 1.30–1.35 in $\Im\Im$, 1.31 in \Im , PW/PL 1.19–1.20 in $\Im\Im$, 1.21 in \Im , PW/PA 1.29–1.31 in $\Im\Im$, 1.32 in \Im , PW/PB 1.30–1.33 in $\Im\Im$, 1.32 in \Im , PA/PB 1.01–1.02 in $\Im\Im$, 1.00 in \Im ; sides widest at about two-thirds from base, a little more strongly rounded in front than in K. kawaguchii, shallowly sinuate at about basal two-ninths, and then parallel to each other towards hind angles; median line deeply impressed on the disc.

Ventral surface rather extensively pubescent though glabrous at the sides. Legs similar to those in K. longulus, short and stout, though somewhat slenderer than in the latter species. Male genital organ very small and lightly sclerotized. Aedeagus a little more than



Figs. 2-3. Kurasawatrechus brevicornis S. Uéno, sp. nov., from the Sanpuku-tôgé on the Akaishi Mountain Range. —— 2. Male genitalia, left lateral view. —— 3. Apical part of aedeagus, dorsal view.

one-fourth as long as elytra, tubular, gently arcuate from base to apex, with the basal part rather abruptly bent towards the ventral side though not so elongate nor so strongly arcuate as in K. longulus; basal orifice relatively large, with the sides shallowly emarginate; sagittal aileron moderately developed though thin and hyaline; apical lobe long and broad, curved strongly to the left and slightly downwards, and more or less widely rounded at the extremity; viewed laterally, apical lobe much broader than in K. longulus; ventral margin widely emarginate in lateral view; inner armature as in K. longulus though the copulatory piece is a little broader in its apical part. Styles longer and slenderer than in K. longulus, each provided with four stout setae at apex.

Type-series. Holotype: ♂, 11-VII-1979, Y. WATANABE leg. Allotype: ♀, 13-VIII-1978, S. UÉNO leg. Paratype: 1♂, 16-VII-1977, S. MORITA leg. All deposited in the collection of the National Science Museum (Nat. Hist.), Tokyo.

Type-locality. Sanpuku-tôgé, 2,570 m alt., SW of Mt. Shiomi-daké of the Akaishi Mountain Range, in Shizuoka Prefecture, central Honshu, Japan.

Further specimen examined. 13, Kitazawa-tōgé, 2,020 m alt., between Mt. Koma-ga-také and Mt. Senjō-ga-také, Yamanashi Pref., 14-VIII-1978, S. Uéno & Y. Arita leg. (NSMT).

Notes. Though considerably differing in facies, this new species and K. longulus seem to be related to each other in view of the basic similarity of their male genitalia. The former appears to be an inhabitant of higher altitude and to replace the latter at the northern part of the Akaishi Mountain Range.

The holotype of the present species was found from beneath a stone lying at the side of the trail on the western side of the Sanpuku-tôgé, a pass of the main ridge about 4 km to the southwest from Mt. Shiomi-daké. It was taken after the manuscript of this paper had been completed, but as the single male previously known is not in a good state of preservation, I have revised the type selection and designated the newly obtained and perfect specimen as the holotype. Needless to say, the description given above was amended accordingly.

The remaining two specimens of the type-series were taken at about the same spot on the eastern side of the Sanpuku-tôgé. As is usual for the Southern Japanese Alps, the eastern slope of the pass is gentle in sharp contrast to the very steep western side, and furnishes mesophilous beetles with favourable habitats. Of the four different species of trechine beetles known from this area, the *Kurasawatrechus* and a *Trechus* occur near the pass, or in a mixed cool-temperate forest above the headspring of the Sanpuku-zawa Valley, and the other two, both *Trechiama*, occur along the stream several hundred metres down the same slope. The present anophthalmic species seems to be confined in a small flat just below the pass, where it is rarely found from beneath large stones deeply embedded in humid soil.

The Kitazawa-tôgé specimen, which was found in coexistence with K. kawaguchii (cf. "Notes" under the heading of that species), is somewhat smaller (2.90 mm in the length of body) than the specimens of the type-series, and slightly differs from the latter in the shape of pronotum. In the specimen in question, the pronotum is a little less transverse than in the type-series and its sides are slightly convergent behind the shallow ante-basal sinuation. Its male genitalia are also somewhat different from those of the Sanpuku-tôgé specimens;

the aedeagus is more regularly arcuate, and the apical lobe is narrower and more strongly curved ventrad, though still much broader than in *K. longulus* in lateral view. The standard ratios of the body parts in the Kitazawa-tôgé specimen are as follows: PW/HW 1.28, PW/PL 1.14, PW/PA 1.27, PW/PB 1.33, PA/PB 1.04, EW/PW 1.60, EL/EW 1.38. However, recognition of an infraspecific taxon for this specimen does not seem to be warranted, since it is basically identical with the type-series. Though situated on the same mountain range, the Kitazawa-tôgé is about 21.5 km distant to the north-northeast from the Sanpuku-tôgé, and is isolated from the latter by several peaks of more than 3,000 m in height. It is, therefore, not surprising even if slight differentiation took place between the two populations.

Kurasawatrechus longulus S. Uéno, 1973

Kurasawatrechus longulus S. Uéno, 1973, Bull. Natn. Sci. Mus., Tokyo, 16, p. 16, figs. 1-3; typelocality: Mt. Nyûgasa-yama.

Notes. No additional record. When I revisited the type-locality in the summer of 1978, I failed even in finding out the small gully in which the type material of this species had been met with. The floor of the larch forest embracing the gully became so thickly covered with Sasa-bamboo after the lapse of fourteen years, that it was very difficult to make a thorough collecting in that place.

Kurasawatrechus kawaguchii S. Uéno, 1973

Kurasawatrechus kawaguchii S. Uéno, 1973, Bull. Natn. Sci. Mus., Tokyo, 16, p. 20, figs. 4-6; typelocality: Mt. Nyûgasa-yama.

Additional specimens examined. 13, Mt. Nyûgasa-yama, 1,830 m alt., Nagano Pref., 16–VIII–1978, S. Uéno leg. (NSMT); 233, Kitazawa-tôgé, 2,020 m alt., between Mt. Komaga-také and Mt. Senjô-ga-také, Yamanashi Pref., 14–VIII–1978, S. Uéno & Y. Arita leg. (NSMT); 19, Kaza-ana Cave, Ryû'unji-yama, Minamimajino, Konami, Suwa-shi, Nagano Pref., 2–V–1979, Y. NISHIKAWA leg. (NSMT).

Notes. The topotypical specimen recorded above was collected in a gully about 800 m distant to the northwest, beyond a low ridge, from the spot where the type material was discovered. It was found clinging to the under surface of a large stone deeply embedded in the soil at the bottom of the gully, which was hardly shaded by trees.

The two specimens from the Kitazawa-tôgé, a pass that is situated at the meeting point of the Kamanashi and Akaishi Mountain Ranges about 16.5 km south by east of Mt. Nyûgasa-yama, agree with the topotypical ones in every detail, with the exception of the relatively narrow apical lobe of the aedeagi. Both are 3.35 mm in the length of body. The standard ratios of their body parts are as follows: PW/HW 1.36–1.37, PW/PL 1.16–1.17, PW/PA 1.31–1.34, PW/PB 1.31–1.34, PA/PB 1.00, EW/PW 1.67–1.68, EL/EW 1.40–1.42.

These specimens were met with in a gully on the southeastern side of the pass. The gully was rather wide and not steep, ran through a beautiful mixed cool-temperate forest, and had no running water in dry seasons. Its banks were formed by heaps of fist-sized stones

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mingled with soil, and were thickly covered with entwined roots of herbaceous plants. At a spot of these banks not far from the upper end of the gully, three specimens of anophthalmic trechine beetles were found, all near the bottom of the heap and from several litres of stones and soil. Two of them were *K. kawaguchii* recorded above, and the other was *K. brevicornis* described on previous pages. Another trechine beetle, *Trechiama kimurai*, which is oculate, occurred here and there along the same gully, but the blind species were never met with in other places than the particular spot.

The single known specimen of *Kurasawatrechus* from Kaza-ana Cave, 3.45 mm in the length of body, is tentatively referred to *K. kawaguchii*, as it is very similar in external features to the specimens from Mt. Nyûgasa-yama and the Kitazawa-tôgé. However, its prothorax is relatively wide at base, and the present identification should be confirmed by ampler material including males. The standard ratios of its body parts are as follows: PW/HW 1.39, PW/PL 1.15, PW/PA 1.36, PW/PB 1.31, PA/PB 0.96, EW/PW 1.66, EL/EW 1.34.

Kaza-ana is a tuff cave lying in Ryū'unji-yama to the south of Lake Suwa-ko, at an elevation of about 950 m. It is about 15.5 km distant to the north-northwest from Mt. Nyūgasa-yama, and is on the continuation of the same mountain range. Though well known among local people, the cave has seldom been visited by speleologists, probably because of its isolated position. The only exception is Toshihiro Komatsu, who visited it several times between 1942 and 1948, and reported on its spider fauna (cf. Komatsu, 1957, pp. 67–70, 1960, 1961, pp. 3–4, 13–15, 20–21, 34–37, 41–44, 48–49, etc.). However, a careful investigation of its fauna was at last made recently by Dr. Kimito Uchikawa, Mr. Yoshiaki Nishikawa, Mr. Akira Noto and myself, whose collection contained a female specimen of the trechine beetle recorded above. It was found in a slit between rock wall and steep muddy slope near the innermost of the cave. Needless to say, we made every effort to find out some more specimens, but were unable to take any, mainly because the cave was so small and dry that the favourable habitat was limited to its innermost portion.

Kurasawatrechus moritai S. Uéno, sp. nov.

Length: 3.40 mm (from apical margin of clypeus to apices of elytra).

Externally close to *K. kawaguchii*, with which it agrees in most of the details, but distinguished at first sight from that species by having obviously thinner antennae, whose apical segments are peculiarly fusiform, and by the presence of deeply impressed scutellar striole on each elytron. Besides, in the present species, the fore-body is larger than in *K. kawaguchii*, the pronotum is relatively transverse, having wider base and less salient front angles, and the elytra are less contracted towards the two ends and have less arcuate sides.

Colour darker than in most of the known specimens of *K. kawaguchii*. Head as in *K. kawaguchii*, but the antennae are obviously thinner, reaching basal one-third of elytra, with segments 5–10 each fusiform, gradually narrowed towards the two ends. Pronotum relatively transverse, widest at about seven-tenths from base, and less contracted basad than in *K. kawaguchii*; PW/HW 1.41, PW/PL 1.21, PW/PA 1.37, PW/PB 1.27, PA/PB 0.93; microsculpture rather irregular, its meshes being evidently more transverse than in *K. kawaguchii*; sides

almost bare, rather strongly rounded in front, distinctly sinuate at a level a little before basal one-fourth, and then slightly divergent towards sharp hind angles; apex obviously narrower than base, with front angles advanced though broad, blunt at the tips and much less sharply marked than in *K. kawaguchii*. Elytra suboval, moderately convex, widest at about fourninths from base, and less contracted towards the two ends than in *K. kawaguchii*, with broader basal and apical parts; EW/PW 1.56, EL/EW 1.41; sides gently arcuate in front, feebly so behind middle, and hardly emarginate before apices, which are separately rounded and form an obtuse re-entrant angle at suture; striae superficial though more clearly marked at the side than in *K. kawaguchii*, even stria 7 being traceable; scutellar striole deeply impressed though not particularly long; apical striole distinct, almost straight in front, gradually becoming shallower anteriad and directed to stria 7; chaetotaxy and microsculpture as in *K. kawaguchii*. Ventral surface pubescent except for lateral parts. Legs as in *K. kawaguchii*.

Male unknown.

Type-specimen (holotype). ♀, 4-VII-1977, S. Morita leg. Deposited in the collection of the National Science Museum (Nat. Hist.), Tokyo.

Type-locality. Abé-tôgé, 1,380 m alt., NE of Umegashima-onsen in Shizuoka-shi, central Honshu, Japan.

Notes. It is difficult to determine the true affinity of this new species, since it has been known only from a single female. So far as the external characters are concerned, it is certainly similar to K. kawaguchii occurring in the northern part of the Southern Japanese Alps, but in such a homogeneous group as Kurasawatrechus, a seeming resemblance between two species can often be misleading from the phylogenetic point of view. It is, therefore, necessary to re-examine its systematic position when male specimens are obtained.

The Abé-tôgé is a pass of the Minobu Mountains, a southeastern continuation of the Shirané Mountain Range, and is about 49 km distant to the south-southeast from the Kitazawa-tôgé. It is situated just above the headspring of the Abé-kawa River, which meanders down southwards and empties into the Pacific Ocean. At its uppermost part, the valley of the main stream slants gently, with rather steep branch gullies here and there. The holotype of the present species was taken in one of such gullies in a deciduous broadleaved forest about 1 km to the west-southwest from the pass. It was found from under a stone lying on a dried bed of the stream, which appeared to submerge on rainy days. Very unfortunately, we have failed in obtaining any additional specimen, though we searched for the trechine beetle both in the nearby gullies and in abandoned adits of old gold mines scattered in the Umegashima area.

General Remarks

The genus Kurasawatrechus is a group of anophthalmic trechine beetles hitherto known from Japan and Korea. It belongs to the group of Trechoblemus and is related to the North American genus Pseudanophthalmus (cf. Jeannel, 1953, pp. 129–130, 1962, pp. 197–200). As can be readily surmised from this relationship, the genus is definitely northern in origin, and though unknown from the Island of Hokkaido, Kurasawatrechus and its close relatives

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are distributed mainly in the areas bordering on the Japan Sea. With the exception of the Fuji-Hakoné area and the eastern part of the Kii Peninsula (cf. Uéno, 1971 a, pp. 756-758, 1971 b, pp. 339-349, 1978, p. 34, 1979, pp. 121-126), the southern coastal areas of Japan do not harbour any anophthalmic species belonging to the *Trechoblemus* complex.

Up to the present, twenty-two species in total of the genus Kurasawatrechus have been described from Japan, and there are still some others awaiting descriptions. Of the described species, K. quadraticollis S. Uéno (1974 a, p. 112, figs. 7–9) of the Abukuma Hills is isolated both taxonomically and geographically, and forms its own species-group. All the others belong to the same species-group though poorly defined subgroups can be recognized, and spread in the central part of Honshu. About one-third of them are endogean and the remainings are cavernicolous, but many of the seemingly cavernicolous species, especially those having short stout appendages, may also occur in endogean habitats. On the other hand, endogean forms of Kurasawatrechus are more frequently met with on high mountains than on low hills. Thus, the Southern Japanese Alps, which lie at the centre of the distributional range of the largest species-group of the genus, seem to have been favoured with the colonization of endogean forms.

Five stations inhabited by Kurasawatrechus have hitherto been known on the Southern Japanese Alps. One of them is a tuff cave lying in a foothill less than 1,000 m above sealevel, while all the others are gullies and/or humid places at higher altitude. The Abé-tôgé station is relatively low (1,380 m above sea-level) and lies in a deciduous broadleaved forest, but the other three are situated in mixed subalpine forests between 1,800 m and 2,600 m in altitude. These endogean habitats are invariably found in such places as are gently sloping and always humid, or in other words, near the headsprings of gentle streams. Unfortunately, streams of this kind are seldom met with on the Southern Japanese Alps because of their precipitous topography. The four stations, especially the Kitazawa-tôgé and Sanpuku-tôgé, are exceptional in this regard and furnish with favourable conditions.

From the trechinological point of view, one of the most remarkable features of the Southern Japanese Alps is the sympatric occurrence of two different species of *Kurasawatrechus* at least at two stations. One of them is Mt. Nyûgasa-yama, where *K. kawaguchii* coexists with *K. longulus* exactly in the same habitat; the other is the Kitazawa-tôgé, where the same species coexists with *K. brevicornis* likewise in the same habitat. No other example of such a sympatry has been known in any part of the distributional range of the genus.

Kurasawatrechus kawaguchii, in which the apical lobe of aedeagus is short, is rather widely distributed on the northwestern part of the Kamanashi Mountain Range. It is endogean at high altitude, but is cavernicolous below the elevation of 1,000 m. On the other hand, K. longulus and K. brevicornis, both endogean, belong to the subgroup in which the aedeagal apical lobe is remarkably prolonged. The former has been known only from Mt. Nyūgasa-yama of the Kamanashis, while the latter spreads on the northern part of the Akaishis and meets K. kawaguchii at the Kitazawa-tōgé. Though considerably differing in facies, the latter can be regarded as a high altitude counterpart of the former and seems less specialized because of its thickset body and short stout appendages.

It is not plausible that the differentiation of the two subgroups should have taken place

on the Southern Japanese Alps, since they can be more or less recognized throughout the range of the species-group. Ancestral trechines of two different phylogenetic lines must have colonized on the mountains independent of each other. A comment on this problem was already made when the Nyûgasa-yama species were described (cf. Uéno, 1973, pp. 15–16). What was unknown then is that one of the two has become differentiated further into two distinctive species, of which the less specialized one occurs at higher altitude, but that the representative of the other subgroup has not undergone noticeable differentiation. A similar sympatry of two species belonging to different phylogenetic lines may possibly be known also on the Northern Japanese Alps, from the southern part of which a subalpine endogean species has already been described. This is K. tanakai S. Uéno (1974 b, p. 265, figs. 1–3) belonging to the same subgroup as K. brevicornis and K. longulus. It is, however, not likely that such a sympatry will be found in future in other parts of Japan.

要約

南アルプスでは、4種の地中性チビゴミムシ類が、5カ所の異なった地点からこれまでに見つかっている。いずれもクラサワメクラチビゴミムシ属 Kurasawatrechus のもので、しかも同一の種群に含まれる。そのうちの2種は、入笠山を模式産地として記載されたものだが、一方は釜無山脈の北西部にかなり広く分布していることが、最近の調査でわかった。残りの2種は新種で、この論文に初めて報告した。4種の種名と既知の産地は、次のとおりである。

- 1) タカネメクラチビゴミムシ K. brevicornis S. UÉNO——三伏峠, 北沢峠
- 2) ニュウガサメクラチビゴミムシ K. longulus S. UÉNO——入笠山
- 3) カマナシメクラチビゴミムシ K. kawaguchii S. Uéno——入笠山,北沢峠;風穴(諏訪市湖南南真志野龍雲寺山)
- 4) モリタメクラチビゴミムシ K. moritai S. UéNo---安倍峠

同一の種群に属するとはいうものの,これらの種は2系統に区分できる.タカネメクラチビゴミムシとニュウガサメクラチビゴミムシとは,雄生殖器の構造からみて同じ系列の種であり,外見上のいちじるしい相違にもかかわらず,同一の祖先から分化してきたものと考えられる.しかし,カマナシメクラチビゴミムシは系統が異なり,地理的にあまり分化していないだけでなく,標高の低い場所では凝灰岩洞からも発見されている.モリタメクラチビゴミムシは,外見がカマナシメクラチビゴミムシによく似ているが,雄個体が見つかっていないので,正確な帰属はわからない.

注目すべき事実は、これら2系統のメクラチビゴミムシ類が、入笠山と北沢峠で同所的に生息することである。それも、同じ石の下や、わずか数リットル程度の石まじり土壌の中から採集されるので、厳密な意味で共存しているものと考えざるをえない。チビゴミムシ類の分化は、地理的な隔離によって引き起こされる場合が多いので、南アルプスにおける共存例はかなり特異である。事実、異なった近縁の2種が同所的に生

¹⁾ A female specimen of Kurasawatrechus most probably referable to K. tanakai was recently obtained by Mr. Sumao Kasahara at the Tokugō-tōgé on the Northern Japanese Alps, which is about 39 km distant to north-northeast from Nigorigō on Mt. On-také, the type-locality of the species. It agrees well with the type-series and has the following standard ratios of body parts: PW/HW 1.31, PW/PL 1.19, PW/PA 1.33, PW/PB 1.35, PA/PB 1.01, EW/PW 1.62, EL/EW 1.39. Its body measures 2.85 mm from the apical margin of clypeus to the apices of elytra. The collecting data of the specimen are as given below:

^{1\$,} Tokugô-tôgé (NW slope), 2,050 m alt., Azumi-mura, Nagano Pref., 13-VII-1978, S. Kasa-hara leg. (NSMT).

息する例は、クラサワメクラチビゴミムシ属では南アルプス以外のどこからも知られていないし、ほかの属のものでも日本では例がきわめて少ない。クラサワメクラチビゴミムシ種群の異なった2系列は、分布域(本州中央部)の全体を通じて認められるので、その分化が南アルプスで起こったとは考えられない。異なった系列に属する祖先種が、おそらく時期を違えて南アルプスに定着し、環境条件のよいところでは、それぞれの子孫のあいだに共存関係ができあがったのだろう。

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